



# City of Austin Invasive Species Management Plan



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## Chapter 1 Introduction

### 1.1 What is an invasive species?

The National Invasive Species Council, established by Executive Order 13112 in 1999, defines invasive species as species that are:

“...nonnative (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.”

The term “invasive” is a biological attribute, meaning that the species under consideration can establish itself outside of its native range and effectively compete with native species, severely disrupting the stability of the affected ecosystem (Walter et al. 2009). “Non-native” (or “alien”, “exotic” or “nonindigenous”) means they have been introduced by human action, intentionally or accidentally, into a region outside their natural geographic range. Invasive species may be a “native” species to the county or to the state but not native to the specific ecosystem where it is causing harm. Introductions occur along a variety of pathways, or vectors, such as through commercial trade of a species, or by accidental means. Invasive species can be plants, animals and other organisms (e.g., microbes).

An invasive species grows, reproduces and spreads rapidly, establishes over large areas and persists. Species that become invasive succeed due to favorable environmental conditions and lack of natural predators, competitors and diseases that normally regulate their populations. As invasive species spread and dominate ecosystems, they decrease biodiversity by threatening the survival of native plants and animals (Texas Invasives.org).

### 1.2 Why do we care? Why are invasive species a problem?

As species are continually introduced to areas outside of their native geographical habitat, non-native plants can create challenges for land managers, especially when they are planted in the wildland-urban interface. Assessments of endangered species found that 49% were negatively impacted by invasive species through competition or predation, ranking second only to direct habitat destruction. Invasive species were found to affect higher proportions of imperiled plants than animals (Wilcove et al. 1998).

Some native species can cause economic or environmental harm or harm to human health. Examples include the economic impact of mesquite spreading through a rangeland, Ashe juniper altering the hydrology of the Hill Country or a painful rash caused by poison ivy. While these species can cause problems, they are not considered an invasive species because they are native. In addition, many non-native species are non-invasive and support human livelihoods or a preferred quality of life. Examples include most crops and a number of exotic ornamentals (IASC 2006).

#### 1.2.1 Case Study, Mayfield Nature Preserve

This case study highlights an inventory of current invasive woody vegetation, volunteer contributions, and future control costs of the Mayfield Park Preserve. The study’s intent was to help land managers and volunteers make informed management decisions pertaining to the natural area.

The overall distribution of woody plants at Mayfield was 77% native species and 19% invasive. Notable invasive plants mentioned in the study are heavenly bamboo (*Nandina domestica*) and Chinese pistache (*Pistacia chinensis*).

Since 2008, over 3800 volunteer hours and \$25,000 have gone towards the elimination of heavenly bamboo and other invasive species at Mayfield. Although this work was reported to have largely removed these problem species, current data estimates that there are a total of 5,536 heavenly bamboo and 4,734 Chinese pistache individuals still growing at the site.

Overall, the remaining 14,480 invasive plants projected to remain in the preserve will require a total of 300 to over 416 hours to remove. Assigning a labor monetary value of \$21.36/hour, the expense of labor alone totals approximately \$6,408 to \$8,885. These figures do not include the expense required to process or dispose of the debris, nor the expense of labor and materials required to treat the stumps with herbicide.

In order to realistically reduce and control the remaining populations of invasives at Mayfield, large amounts of additional time and labor will be required (Murray 2001).

### **1.2.2 Economic Impact**

The annual economic costs of invasive species to the US economy, from damages to managed and natural ecosystems to costs of control, are estimated at \$120 billion (Pimentel et al. 2005). In 2000, the US federal government spending on invasive species activities was \$556 million (Lovell and Stone 2005). The California Invasive Plant Council estimated annual expenditures of \$82 million on control, monitoring and outreach. In Nevada, it is estimated that invasive plants, such as malta-star thistle (*Centaurea melitensis*), reduce wildlife-related recreation between \$6 million and \$12 million annually (Eiswerth et al. 2005). More specifically, in 1993, the Office of Technology Assessment of the US Congress stated that the State of Florida spends approximately \$14.5 million annually on hydrilla (*Hydrilla verticillata*) control. Regionally, the Lower Colorado River Authority spends \$100,000 annually on invasive aquatic species control, excluding losses due to power shutdowns, obstructions to hydrogenation units, turbine damage and maintenance water drawdowns (TWCA 2010). In 2010, a roadside installation and maintenance study in Williamson County (0.64 miles) found potential savings of \$3,820-69,750 over 20 years when altering right-of-way maintenance and using strict native seed mixes versus standard Texas Department of Transportation Urban and Rural Specs containing non-native species including Bermudagrass (*Cynodon dactylon*) (TBG and LBJWC 2010). Locally, the Austin Energy Decker Creek Power Station continues to experience impairment in reservoir uses (cooling water withdrawal, shoreline use boat-ramp access) from *Hydrilla* and algae, jeopardizing facility operations and annual direct expenditures of \$318,539 by anglers (Austin Energy 2010). The Austin Water Utility, Wildland Conservation Division has invested \$12,477 in annual direct costs and \$15,128 in annual volunteer contributions over the past four years to target invasive species (McCaw, pers. comm).

### **1.2.3 Ecological Impact**

#### **Soil Health**

Invasive plants frequently initiate a multitude of impacts on community soil chemistry and ecosystem function. All plants modify the soil environment through plant-soil feedback interactions, but some negative consequences such as introduced pathogens and allelopathy (one plant produces chemicals that inhibit the growth of other species) can be exacerbated by invasive species (Inderjit 2010). Root exudates and plant litter affect soil structure, modify soil nutrient pools and alter nutrient cycling of plant communities, including hydrology of the soil (Weidenhamer 2010). One example is Johnsongrass (*Sorghum halepense*), which is capable of growing in nutrient poor soils (i.e. native prairie soils) through its ability to fix nitrogen, taking nitrogen from the air and, through interaction with soil biota, incorporating the nitrogen into the soil in a form plants can use. While some native prairie species can fix nitrogen, most are adapted to nutrient poor soils and do not perform well in soils with elevated nitrogen. At the same time, these conditions enhance Johnsongrass growth. Thus, the ability of Johnsongrass to fix



nitrogen, changing soil biogeochemistry, enhances its ability to invade and create near monocultures in soils that once supported diverse plant communities (Rout 2008).

#### Tree Cover

Invasive, non-indigenous tree and shrub species represent a significant problem to natural vegetative communities within the state and local area. It is widely agreed that invasive species degrade natural communities by dominating forest canopies, altering soil chemistry and hydrologic characteristics, displacing native species, interfering with successional patterns and degrading biodiversity (Pase 2005, Swearingen et al. 2002). More specifically, in conditions where invasive plants dominate canopy cover, the native woodland community can be adversely affected. An example of the interaction between canopy cover and individual species can be found in Texas red oak (*Quercus buckleyi*). Texas red oak becomes light-limited when ambient light transmission is less than 40% (White, pers. comm.). Canopy conditions less than the threshold stated above would reduce species fitness and potential woodland regeneration of oak species, a major component of golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) habitat (BCPP 2007, Kroll 1980). Golden-cheeked warblers require woodland habitats, with diverse canopies and the presence of mature Ashe juniper (*Juniperus ashe*) (BCPP 2007, Magness 2006, Kroll 1980).

#### Hydrology and Water Yield

Woodlands, native and non-native, demonstrate greater rainfall interception than grasslands, enhanced net evapotranspiration, lower water tables, and reduced volume of stormwater runoff. Vegetation types differ in rates of evapotranspiration, rainfall interception, surface flow and ability to access water (McCaw, unpublished).

Invasive plant species, with evapotranspiration rates higher relative to native flora, can alter hydrological regimes and lower water tables (Gordon 1998). In New Zealand, invasive woody afforestation reduced annual water yield by 30-80% during low flow conditions (Davie 2005). In South Africa, exotic woody plants reduced surface flows approximately 7% (Le Maitre et al. 2001). In South Texas, evidence suggests that Giant Reed (*Arundo donax*) exhibits greater water use in riparian areas than other riparian reeds, resulting from increased transpiration rates and leaf area (Moore 2011). Such hydrological changes will likely influence frequency, duration and scale of climatic events, as well as natural disturbances (Gordon 2010).

Regionally, significant reductions in water yield can occur when grasslands are converted to woodlands. Hydrologic modeling of plant communities indicates a woody cover threshold (20%), leading to significant reductions in water yield. Reduction of woody canopy cover, via grassland restoration and management, is necessary to restore and maintain higher water yields (Conrad et al. 2006, Wu et al. 2001 ).

A significant amount of city property is managed to balance the needs of a range of uses, most notably the protection of water resources and species preservation. To ensure a stable water supply, the city addresses water quality/quantity issues, through appropriate land management techniques, within recharge zones to produce and enhance optimum levels of clean, high quality water.

#### Biodiversity and Avian Communities

Invasive plants reduce the abundance and diversity of native wildlife by displacing native plant communities. Substantial displacement of native plants occurs in the wildland-urban interface, leading to habitat fragmentation and unsuitable habitat for native animals. Resulting habitat changes lead to the decline and potential loss of wildlife species dependent on native flora for survival. Diverse plant



communities provide a variety of food sources, vertical structure and cover, nesting sites and thermal cover, creating more niches for a broader animal community to reside (Kalmbach 2006). Consequently, invasive plant monocultures provide quality habitat for fewer species overall and may favor non-native wildlife.

Invasive plants have a significant influence on avian populations with native bird diversity and density often falling as the cover of invasive plants increases. A South Texas study found that overall bird abundance was 32% greater on native-grass sites than on exotic-grass sites (Flanders et al. 2006). In Arizona, strong associations have been identified that indicate degraded native land cover supports fewer native birds than do non-degraded areas, thereby avian diversity and species richness (Germaine et al. 1998).

In Austin, research indicates that the presence of invasive plant species influence avian fauna, contributing to the decline in avian diversity in the wildland-urban interface. At unimpacted sites, avian abundance (number of individuals) and species richness (number of species) were positively correlated to the presence of native plants and the structure those plants provide (Kalmbach 2006). In 1996, the U.S. Fish & Wildlife Service tasked the City of Austin and Travis County to create a preserve system to conserve and improve habitat for eight endangered species, including two avian species. The City of Austin dedicated acquired properties and previous holdings for enhancement of endangered species through habitat protection and land management of native plant communities.

### **1.3 How did invasive plants get here?**

When a species establishes in a new ecosystem, it is considered “introduced”. Although wind and water are recognized pathways of invasion, humans originally introduced the majority of invasive species, intentionally or unintentionally. This may happen, for example, when people plant garden ornamentals, range forage plants for cattle, or plants used for erosion control and habitat enhancement for game species of wildlife. This can also occur when animals and insects are introduced to be used to control other organisms (particularly in agriculture) (Simberloff & Stiling 1996).

Other species are introduced accidentally on imported nursery stock, fruits, in ship ballast waters, on vehicles, in packing materials and shipping containers, through human-built canals, and from human travel and land management practices. Dumping exotic fish and plants from aquaria into the water or wild are other common ways invasive species spread (Texas Invasives.org, Walter et al. 2009).

### **1.4 Integrated Pest Management Principles, Control, and Herbicide Use**

Integrated Pest Management is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. Integrated Pest Management programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. The Integrated Pest Management approach can be applied to both agricultural and non-agricultural settings, such as the home, garden and workplace. Integrated Pest Management takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides (U.S.,EPA <http://www.epa.gov/opp00001/factsheets/ipm.htm>).

Integrated Pest Management is not a single pest control method but, rather, a series of pest management evaluations, decisions and controls. In practice, land managers follow a four-tiered approach.



Integrated Pest Management first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken. The level at which pests will either become an environmental or economic threat is critical to guide future pest control decisions.

Integrated Pest Management programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made in conjunction with action thresholds. This monitoring and identification removes the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.

As a first line of pest control, Integrated Pest Management programs work to manage open spaces to prevent pests from becoming a threat. In an agricultural crop, this may mean using cultural methods, such as rotating between different crops, selecting pest-resistant varieties, and planting pest-free rootstock. In natural areas, this involves using sound land management to minimize soil damage and to encourage native diversity and ecosystem health. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

Once monitoring, identification, and action thresholds indicate that pest control is required; Integrated Pest Management programs then evaluate the proper control method both for effectiveness and risk. Control means eradicating, suppressing, reducing or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions (Executive Order 13112). Effective, less risky pest controls are chosen first, such as manual and mechanical control. If further control is required, then additional pest control methods would be employed, such as targeted spraying of pesticides. Pesticides are used when necessary, but only in a way that minimizes potential exposure to people and the environment.

#### **1.4.1 Current Departmental Management Plans**

The following list reflects the current departmental Integrated Pest Management and land management plans that are in use during the creation of this citywide plan. It is recommended that the individual departmental plans be updated annually.

Austin Energy: Aquatic Vegetation Management, Decker Creek Power Plant.  
Austin Energy: Transmission Right-of-Way Maintenance, Integrated Vegetation Management.  
Austin Parks and Recreation: Integrated Pest Management Program.  
Austin Water Utility: Water Quality Protection Lands Program. Integrated Pest Management Plan.  
Austin Watershed Protection: Stormwater Pond Dam Safety Program.  
Balcones Canyonlands Preserve: Land Management Plan, Tier II A, Chapter IV, Vegetation Management.

#### **1.5 City Of Austin Resolution (20100408-030)**

In order to address the significant economic, ecological and health impacts of invasive species on Austin, and to encourage community collaboration and innovation, the City Council approved a resolution on April 8, 2010 calling for the development of a city wide plan for invasive species management (Appendix D). The resolution focused on invasive aquatic, riparian and terrestrial species that influence the productivity, value and management of land and water resources within city-managed lands. The City



Council directed the City Manager to develop an Invasive Species Management Plan, henceforth known as the plan, for the control and/or eradication of non-native invasive species in order to protect and restore the city's natural resources, and report back to Council on or before June 5, 2010. Additionally, a multi-departmental (six departments) team was organized to determine the proposed management plan scope, completion time, budget and estimated staff resources required for implementation.

The "significant negative impacts" which the Resolution sought to address include: reduction in biodiversity, altered ecosystem energy flow, degraded aquatic systems, reduction in riparian and lake quality, habitat losses, alteration of regional flora and fauna, loss in value of area open spaces, adverse impacts on human health and property value and loss of native seed bank.

To address these impacts, the City will: (1) develop an Invasive Species Management Plan for the control and/or eradication of undesirable aquatic and terrestrial species; (2) estimate the annual costs of invasive species removal/control which should include volunteer efforts; (3) consider education and public awareness as a major component of the plan that will document, map, and monitor invasive species; and, (4) consider creating an inter-departmental working group to facilitate plan development, incorporating inventory, prevention, early detection/rapid response, control, management and restoration techniques.

### **1.6 Scope, purpose and goals**

The scope of this plan includes all invasive aquatic, riparian and terrestrial species within City of Austin owned or managed lands. Currently, the plan focuses on plant species, but other groups could be integrated in the future. The goal is to reduce the cover and expansion of invasive species on city-managed properties through a coordinated plan that facilitates interdepartmental coordination, city-wide monitoring, coordination of volunteer efforts and establishes a set of minimum standards for all city departments involved in vegetation management. Individual departments are charged with developing site specific management plans.

The Plan includes development of recommended methodology for establishment of baseline plots and consistent adaptive management for all properties in all departments. The Plan follows the National Invasive Species Council guidelines for invasive species management (prevention, early detection and rapid response, control and management, restoration, organizational collaboration and education/outreach). The Plan identifies current threats and management strategies and provides a decision making process so that new threats can be identified and acted on appropriately.

### **1.7 Plan Development Process**

On June 3, 2010, following the passage of resolution (20100408-030), city memorandum (CUIR #304; Appendix D) established an inter-departmental executive committee to develop the scope for the Plan (Figure 1.8.1). Subsequent to that memo, an agreement with the Lady Bird Johnson Wildflower Center, at the University of Texas, to facilitate the plan's development led to creation of a stakeholder group, called the Working Group, made up of representatives from within the City of Austin and outside stakeholders (Appendix A). The City of Austin departments represented are Austin Energy, Austin Water Utility, Parks and Recreation Department, Planning and Development Review, Public Works Department and the Watershed Protection Department. The outside stakeholder groups are the Austin Parks Foundation, Keep Austin Beautiful, Texas Parks and Wildlife and the Austin Invasive Species Coalition. The group, charged with the primary development of the plan, used a consensus-based process to develop an initial draft, which was then reviewed by an Advisory Group of local, regional and state organizations.



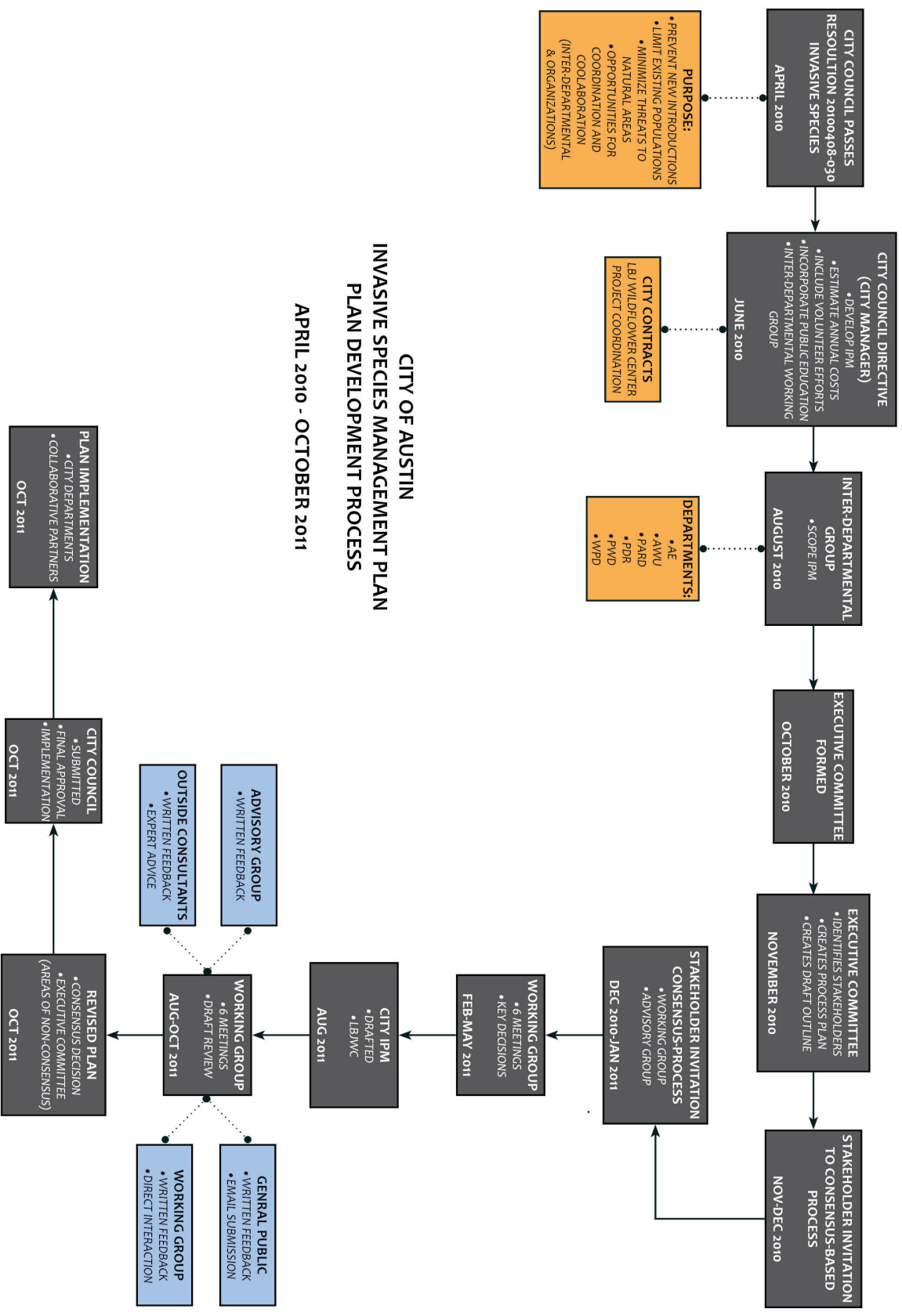


Figure 1.8.1 Plan development process.

Over the course of six meetings, The Working Group used a consensus-based process to make key decisions about the determination and definition of invasive plant species for the plan, reviewed existing invasive plant management projects, assessed current procedures and Best Management Practices (BMPs), defined project goals, and identified resources and constraints. A second series of consensus-based meetings were held to address feedback from the Advisory Group and general public and to refine the plan.

Following final approval by the Working Group, the revised plan followed City protocols for internal and public review and comment and was ultimately submitted to the City Council for final approval, implementation and public distribution.

### **1.8 Geographic extent of plan**

This pertains to all property that is owned or managed by the City of Austin. The city wishes to extend the reach of the plan by: developing and advancing innovative ways to protect the environment, conducting research and planning, establish education and public awareness campaigns, and collaborating and coordinating with local, regional and state partners to prevent new introductions and manage existing populations. Additionally, the city strongly encourages working with educational institutions in identifying opportunities for collaborative research and gaps in knowledge pertaining to invasive species.

### **1.9 Plan structure**

The contents of the plan are set out in six chapters to provide an insight into the management process and the range of information that has been collated and assessed to establish the proposed management strategy and activities.

The plan contains background chapters on local and regional programs, and the environmental and economic impacts on the community. It describes current and past programs, coordination and collaborative opportunities, and the contribution of countless volunteers towards invasive species removal. Subsequent chapters explain how invasive species will be managed on a city wide scale and the goals that provide directives to those management strategies. In addition, estimated costs and opportunities for funding sources are provided for the city-wide management of invasive species.

Beyond this general information, a field resources section (Book 2) is included that provides species specific management information for 24 invasive species identified as problematic in Austin as well as a species prioritization system. Further information on the plan development process and supporting documentation can be found in a series of Appendices (Book 3).



## Chapter 2 Existing City Programs

### 2.1 Overview

The City of Austin currently spends \$2,004,958 yearly on invasive species management. Projects are organized, funded and tracked at the departmental level and, at present, no system for city-wide project coordination or monitoring is in place. Departments vary in their level of invasive management expertise, established treatment protocols and monitoring activities (Table 2.1). Resource sharing between departments can be difficult and, more importantly, the lack of inter-departmental coordination means that opportunities to increase city-wide effectiveness can be missed. Simple ways to increase overall effectiveness, without significantly increasing cost, include coordinating the timing of treatment efforts in areas of overlapping, or adjacent, jurisdiction and layering invasive species management efforts on other activities when possible. For example—Austin Energy could remove invasive species rather than cutting them back in power line rights-of-way. Austin Energy benefits because the same plants do not have to be trimmed again the following cycle, and surrounding properties benefit because power line rights-of-way would no longer serve as a seed source for invasive species. If the surrounding property is a city park or wildland, that park could then time their invasive management activities near the power line to build off the work Austin Energy had begun. This type of cooperation has occurred in the past, with programs such as Nature Wise, in which the Parks and Recreation Department partnered with Solid Waste Services to mulch invasive brush removed from parks along with yard trimmings. One of the goals of a city-wide plan is to facilitate this type of coordination.

At the present time, mapping of existing infestations and monitoring of treated areas is handled within departments with differing levels of precision. The creation of an easy-to-use city wide tracking system will make prioritizing treatment strategies easier and will help managers detect and respond to new infestations before they can become a serious problem.

Volunteers, particularly trained volunteers, are a significant resource in invasive species management, both in tracking and treatment activities. Currently the training requirements and the activities volunteers are allowed to perform vary across departments. It is complicated for volunteers to provide service to more than one department and for managers to confirm a volunteer's level of skill and training. A standardized system for training and certifying volunteers for different levels of activities would simplify this process and maximize returns on the city's investment in volunteer training.

Finally, the use of integrated pest management, a common sense approach that uses a combination of the least toxic, effective and economically feasible control methods available, varies with department and property. Some departments have written plans, some follow an integrated pest management approach but lack a written plan and, in some cases, integrated pest management is not followed. This plan should provide a set of minimum standards for all departments to follow an IPM approach.

### 2.2 Summary of current activities

Five city departments are involved in invasive species management: Planning and Development Review, Parks and Recreation, Austin Water Utility, Watershed Protection and Austin Energy (Table 2.2). This section provides a summary of the types of activities performed by these departments.

**Planning and Development Review** deals with invasive species indirectly through the permitting process. Development submittals include a tree survey, including trees that are non-native invasives, for the site. This department is in a position to encourage invasive species removal as part of the application approval



Table 2.1. Departmental involvement in invasive species management

Department	Management	
	Yes	No
Austin Energy	x	
Austin Police Department		x
Austin Public Library		x
Austin Water Utility-Wildland Conservation Division		
Balcones Canyonlands Preserve	x	
Water Quality Protection Lands	x	
Community Court		x
EMS		x
Fire		x
Parks and Recreation Department (PARC)		
Parks and Preserves	x	
Urban Forestry	x	
Golf	x	
Planning and Development Review	x	
Solid Waste Services	x	
Watershed Protection Department	x	

process. Currently, mitigation (i.e. replacement trees) is not required for removal of non-native invasive trees specified in the Environmental Criteria Manual (ECM) section 3.5.4. With recent Environmental Criteria Manual revisions, Land Use Review staff now has rules in place that encourage invasive species removal. Land Use Review has revised the regulatory tree survey, preservation and mitigation list, ECM Appendix F: Descriptive Categories of Tree Species, to ensure that no non-native, invasive plants are on the list. The list now only includes trees native to either the Texas Blackland Prairie or the Edwards Plateau.

**The Parks and Recreation Department** is involved in management through the urban forestry, parks and golf programs. Urban forestry is involved in city wide efforts focused on woody invasive species. An integrated pest management approach is used and a monitoring protocol is in place. An integrated pest management plan has been developed, providing policy and guidance for all parks. The plan is updated annually as new information within the industry is developed to provide best practices in a park setting. At this time, the overall strategy is ad hoc. Most treatment activities are accomplished through staff lead grants utilized by outside contractors and through volunteer assistance. Some parks, such as Zilker Nature Preserve, have written integrated pest management plans and formal monitoring protocols are in place, while other parks and preserves take a more informal approach. Invasive species management is more limited within the golf courses than within parks and preserves. A golf integrated management plan exists, but in practice invasive species are addressed primarily when they pose a safety issue or interfere with the integrity of the golf course.

**The Watershed Protection Department** integrates invasive species management into stormwater treatment, riparian and stream restoration activities. The primary targets are hydrilla and species that threaten stream and riparian health.

**The Water Utility's Wildland Conservation Division**, which includes the Balcones Canyonland Preserve



Department	Project/Location	Annual Direct Cost (\$)	Annual Volunteer Contributions (\$) <sup>1</sup>	Written IPM	IPM Approach	Mapping	Post-treatment Monitoring
Austin Energy	Decker Lake Hydrilla Removal / Transmission ROW	1,362,624	-	X		X	X
Austin Water Utility-Wildland Conservation Division	Balcones Canyonlands / Water Quality Protection Lands	12,477	15,129	X	X	X	X
Parks and Recreation Department	Preserves / Urban Forestry	543,195	157,756	X		X	X
Watershed Protection Department	Stormwater Ponds / Waterways	86,662	769	X	X	X	X
<b>Total</b>		<b>2,004,958</b>	<b>173,654</b>				

<sup>1</sup> Annual Direct Volunteer Contribution valued at \$21.35/hr

Table 2.2. Summary of current invasive species management.



and the Water Quality Protection Lands, integrate invasive species management into day to day operations. Land management, and thus invasive species management, is part of the core missions of these programs. Monitoring, management and restoration protocols are well established. Treatment activities within the Water Quality Protection Lands are guided by a written integrated pest management plan and land management plan, and activities within the Balcones Canyonland Preserve are guided by an integrated pest management approach and a written land management plan.

**Austin Energy** controls hydrilla when necessary to protect intake valves on Decker Lake and performs vegetation maintenance under power line rights-of-way as necessary to protect integrity of, and access to, power lines.



## Chapter 3

### Regional Programs

It is important that the City of Austin be aware of other invasive species management efforts, particularly those that could support or enhance the effectiveness of the COA plan. To that end, this chapter lists some of the best examples of local, regional and national programs to prevent and control invasive species.

#### 3.1 Local and Municipal Programs

Austin Invasive Species Coalition (AISC) - <http://www.austininvasives.org/>

A centralized website for Austin-area events and education related to preserving plant biodiversity through invasive removal and education.

Austin Parks Foundation - <http://www.austinparks.org/restoration.html>

Since 1992, Austin Parks Foundation has initiated, promoted, and facilitated physical improvements, new programming, and greater community involvement for Austin's parks.

COA Grow Green - <http://www.ci.austin.tx.us/growgreen>

Grow Green is a water quality education program that promotes least-toxic solutions to gardening problems. See Invasive Plant Field Guide (<http://www.ci.austin.tx.us/growgreen/downloads/invasiveplants.pdf>) and Invasive Plants to Avoid – ([http://www.ci.austin.tx.us/growgreen/downloads/pg\\_invasive.pdf](http://www.ci.austin.tx.us/growgreen/downloads/pg_invasive.pdf)).

EcoTexas - <http://ecotx.org/>

EcoTexas is a nonprofit organization that encourages the public to take action to reduce the threat of invasive species through workdays and education.

Keep Austin Beautiful (KAB) - <http://www.keeppaustinbeautiful.org>

KAB provides resources and education to inspire individuals and the Austin community toward greater environmental stewardship.

City of Portland Invasive Species Program - <http://www.portlandonline.com/bes/index.cfm?c=45696>

The City of Portland has taken significant steps to limit the negative effects of invasive species. In November 2005, the Portland City Council adopted Order 36360 which required the city to develop a three-year work plan and ten year goals to integrate invasive plant management into existing city programs and reduce invasive plant coverage in Portland.

#### 3.2 State Programs

Texas Invasive Plant and Pest Council (TIPPC) - <http://www.texasinvasives.org>

The Texas Invasive Plant and Pest Council (TIPPC) is a 501C non-profit organization representing stakeholders from state and federal agencies, conservation organizations, academia, green industry and the public sector.

Texas Invasive Species Coordinating Committee (TISCC) - <http://www.tiscc.texas.gov/>

This committee includes the following agencies: The Texas State Soil and Water Conservation Board, Texas Department of Agriculture, Texas AgriLife Extension Service, Texas Parks and Wildlife, Texas Forest Service, and the Texas Water Development Board.

Texas Parks and Wildlife Department - <http://www.tpwd.state.tx.us/>

The Texas Parks and Wildlife Department provides outdoor recreational opportunities by managing and protecting fish and wildlife and their habitat and by acquiring and managing parks, historic sites, and wildlife areas. Its mission is to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

Texas Forest Service- <http://texasforestservice.tamu.edu>

The Texas Forest Service was created in 1915 as an integral part of The Texas A&M University System. Its mission is to provide statewide leadership and professional assistance to assure that the state's forest, tree, and related natural resources are wisely used, nurtured, protected, and perpetuated for the benefit of all.

Texas AgriLife Extension- <http://agrilifeextension.tamu.edu>

Working hand-in-hand with its Texas A&M System partners, the state legislature, and the communities it serves, the mission of the Texas AgriLife Extension Service to serve Texans through community-based education has remained unchanged for almost a century.

### **3.3 Regional Programs**

California Invasive Plant Council- <http://www.cal-ipc.org/>

Research, restoration, and education on California's fight against wildland plant invaders.

Invasive Plant Atlas of New England- <http://nbii-nin.ciesin.columbia.edu/ipane/>

Database of invasive and potentially invasive plants in New England.

Mid-Atlantic Exotic Pest Plant Council- <http://www.ma-eppc.org/>

A one-stop shop for information regarding invasive plants of the Mid-Atlantic region.

Midwest Invasive Plant Network- <http://mipn.org>

MIPN's mission is to reduce the impact of invasive plant species in the Midwest.

Southeast Exotic Pest Plant Council- <http://www.se-eppc.org/>

A forum for the exchange of scientific, educational and technical information in the southeastern U.S.

### **3.4 National Programs**

National Invasive Species Council (NISC) - <http://www.invasivespecies.gov/>

Established by Executive Order (EO) 13112 to ensure that Federal programs and activities to prevent and control invasive species are coordinated, effective and efficient.

USDA Animal and Plant Health Inspection Service (APHIS) - <http://www.aphis.usda.gov/>

APHIS provides leadership in ensuring the health and care of animals and plants. The agency improves agricultural productivity and competitiveness and contributes to the national economy and the public health.

Lady Bird Johnson Wildflower Center- <http://www.wildflower.org/>

The mission of the Lady Bird Johnson Wildflower Center is to increase the sustainable use and conservation of native wildflowers, plants and landscapes. As an experienced educational organization, the Wildflower Center specializes in building partnerships between likeminded organizations and in the dissemination of information to the public.



USDA Forest Service Forest Health Protection- <http://www.fs.fed.us/foresthealth/>

Since its beginnings over a half-century ago, the Department of Agriculture (USDA) Forest Service Forest Health Protection (FHP) program has built an organization of specialists trained to provide technical assistance on forest health-related matters. The mission of FHP is to protect and improve the health of America's forests.

National Association of Exotic Pest Plant Councils- <http://www.naeppc.org/>

The National Association of Exotic Pest Plant Councils (NAEPPC) was established in October 1995 by the signature of representatives of the first four state and regional Exotic Pest Plant Councils (see attached MOU). NAEPPC was established because the Exotic Pest Plant Councils recognized the value of cooperation through a national association of like organizations that share common goals.

National Institute of Invasive Species Science- <http://www.niiss.org>

The National Institute of Invasive Species Science is a consortium of government and non-government organizations formed to develop cooperative approaches for invasive species science that meet the urgent needs of land managers and the public. Administratively housed at the U.S. Geological Survey Fort Collins Science Center in Colorado, the National Institute of Invasive Species Science provides a hub for invasive species science collaboration, coordination, and integration across agencies and disciplines.

Sustainable Sites Initiative - <http://www.sustainablesites.org/>

The Sustainable Sites Initiative is a voluntary rating system that encourages sustainable landscape design, construction and maintenance. Prerequisite 4.1 requires control and management of known invasive species found on site.

## Chapter 4 Management

### 4.1 Prevention

Often the most cost-effective approach to combating invasive species is to keep them from establishing in the first place. Prevention is the first line of defense against invasive species and should be a primary focus of the City of Austin.

Actions such as management plans, standard operating procedures and education and outreach efforts are all important tools that can be applied within a comprehensive strategy to prevent the establishment of invasive species. Prevention efforts must have the coordinated support of the City of Austin as well as other interested parties.

The following are recommended preventative measures (adapted from the BCP Land Management Plan).

- Adjacent landowners should be encouraged to use native plants (or non-invasive ornamentals) in place of aggressive non-natives.
- Local nurseries should be educated about aggressive species
- Limit soil disturbance
- Recently exposed or disturbed areas should be quickly revegetated with native species. An approved standard easily acceptable seed mix could be developed for areas of disturbance.
- When feasible, seeds used in restoration projects should be collected near the area to be restored and should be free of weed seeds.
- Managers should be careful of introducing problem weed seeds in purchased soils and other materials for projects such as trail maintenance, erosion control or landscaping. Equipment should be cleaned before bringing onto a property to prevent bringing in problem species.
- Managers should monitor areas after work has been done to ensure that problem weeds were not introduced. This follow-up monitoring may need to continue for several years.
- Managers should give control efforts along roads and utility corridors high priority, as they can provide a conduit for invasive seed as well as a favorable growing environment for many invasive species.
- When new construction or invasive removal is planned, minimize soil disturbance and plan to monitor disturbed areas, revegetating with native species and treating invasives as necessary following an integrated pest management process.
- Departments should develop and periodically update a “watchlist” of species to be alert for, training staff so they can easily recognize highly invasive plants such as Buffelgrass and Kudzu.
- Managers should especially monitor public use areas for the spread of invasive and watchlist species.
- Managers should develop methods to avoid spreading non-native plants to other areas especially when conducting active removal of non-natives, invasives and watchlist species and when conducting work along utility corridors. Special attention and procedures should be applied to cleaning boots, hand tools, construction and maintenance machinery.
- Managers should use care when using so called “native” seed mixes, which may contain invasive species and species non-native to Central Texas. It is recommended that managers obtain single or specific species seed from reliable local suppliers (rather than a larger retailer of mixes prepared by a national company), or to request a local supplier to custom-prepare a local or species specific seed mix.



## 4.2 Early detection and rapid response

While prevention is the first line of defense, even the best prevention efforts will not stop all invasive species. Once a species becomes widely established, control efforts become costly and eradication is unlikely, therefore early detection and rapid response efforts increase the likelihood that invasions will be halted and eradicated.

It is recommended that the City of Austin follow the National Invasive Species Council approved *General Guidelines for the Establishment and Evaluation of Invasive Species Early Detection and Rapid Response Systems* (Appendix G).

Early Detection and Rapid Response actions are grouped into three (3) main categories:

1. Early Detection
2. Rapid Assessment
3. Rapid Response

### 1. Early Detection

Early detection provides initial evidence of an invasive species. Early detection can be achieved by “active detection networks” comprised of individuals that have specific job training and responsibility to find invasive species. They typically focus on species of concern, high-risk pathways and locations. The identification of species is essential to early detection efforts.

### 2. Rapid Assessment

The detection of an invasive species initiates the Rapid Assessment process. Rapid assessment may recommend that a response be initiated. In addition, assessments of potential invasions can be conducted in advance of their detection. The rapid assessment process is an essential aspect of timely Early Detection and Rapid Response.

### 3. Rapid Response

Rapid response efforts contain and, where possible, eradicate invasive populations. Because response efforts are localized, they should be performed by City of Austin trained staff. However, even localized populations can cross jurisdictional boundaries, and interdepartmental cooperation is essential to success. To be effective, response efforts often need partners from both the private and public sectors. For example, federal agencies conduct rapid response efforts on federal lands and partner with other in inter-jurisdictional efforts.

## 4.3 Control measures and management overview

Some invasive species may be too widespread to contain or eradicate. However, control and management efforts can slow and/or reduce their impacts. It is recommended that the City of Austin follow the National Invasive Species Council approved *Guidelines for Ranking Invasive Species Control Projects* (Appendix G).

The working group has developed a list of the most common and/or problematic invasive plant species of concern for the City of Austin (Book 2, Field Resources) using the Texas Invasive Plant and Pest Council Plant Assessment Form adapted from *Criteria for Categorizing Invasive Non-native Plants that Threaten Wildlands* (Warner et al 2003). Each department should prioritize this list according to their mission. If an alert is triggered for any species, departments should work together to develop effective interdepartmental control and management strategies for that species. After a comprehensive distribution map of invasive plant species is completed, the list should be reevaluated and updated. The list should be reevaluated and updated every 5 years subsequently.

Managers should utilize employees, contractors and volunteers to implement Integrated Pest





Management strategies. Following the Integrated Pest Management framework the City of Austin will always use the least toxic, effective economical approach first. When using herbicide, the City of Austin will use the least toxic effective herbicide (White 2007) and follow all state and federal laws pertaining to herbicide use. Control and management of invasive species is accomplished using modern resource management methods. Several complementary methods may be implemented in an overall strategy to protect ecosystems and aid in their recovery.

Strategies should be analyzed and adjusted as needed and work (including follow-up and monitoring) should be conducted for many years. Control efforts reduce invasive species to more acceptable levels and management prevents spread and re-emergence.

City of Austin departments should develop control plans for individual invasive species or for certain areas within their jurisdiction following their rules and regulations. This document contains sample control and management practices for 24 common non-native invasive plants found in Austin (Book 2, Field Resources).

Soil protection is an important consideration during all invasive management activities. Bare soil tends to erode easily and can be easily reinvaded. Potential damage to soil should be weighed against the possible benefits of invasive removal. If infestation is extensive and complete removal of invasives would require damaging the soil to the point that active restoration of the soil (ripping, amending) would be required, than a phased approach should be adopted in which treatment and restoration occurs little by little.

#### **4.4 Restoration and Rehabilitation (Address soil disturbance. Revegetate with appropriate species)**

In some cases, communities can recover once invasive species are removed as long as follow-up management and monitoring prevents re-invasion. However, in cases of severe degradation, natural recovery processes can be overwhelmed by invasive species and active restoration is required. Although restoration efforts have common elements, each area is unique. Work must be guided by site-specific considerations and analysis. However, some generalizations can be made. When soil is disturbed, and especially if it is left bare, it must be revegetated with appropriate species to prevent soil loss and reinvansion.

The goal of restoration is to restore ecosystem process, not simply to replace components. Ecosystem processes allow natural systems to repair themselves and to remain relatively stable. In practice, the assessment and repair of natural processes begins with the soil. In the process of treating and removing invasive species, the soil may be disturbed and left bare. In some cases, compaction reduction activities and organic soil amendments may be needed to restore soil to a useful state. Soil disturbance should be addressed and the area should be revegetated with appropriate native species as soon as possible. When immediate revegetation is not possible, temporary soil protection measures such as mulch may be needed. However, mulch suppresses all germination which can complicate later revegetation efforts.

Generalized revegetation protocols can be found in the City of Austin Environmental Criteria Manual.

Even the best restoration efforts may not return an ecosystem to its desired condition. It is far better to prevent or control invasive species and to prevent soils damage before restoration is required.

#### **4.5 Prioritization**

Before management techniques can efficiently be implemented, invasive species of concern must first be prioritized. To this end, the working group established a list of 24 species that all departments



were currently targeting. Each species was initially assessed using an adapted version of the *Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands* (Criteria). These criteria have been designed to support categorized lists of invasive plants by ranking each plant's level of threat to the ecological health of wildlands through evaluation of its ecological impact, ability to invade natural vegetation communities and current extent of its invasion. Evaluators use an associated "Plant Assessment Form" to score species using the criteria and to document supporting evidence. Developed by the California Invasive Plant and Pest Council (Cal-IPPC), for use in California, Arizona and Nevada, these criteria can be adapted for use in other states or regions by substituting appropriate ecological types for that state or region (Warner et al. 2003). In 2009, the Texas Invasive Plant Council adapted these criteria to fit ecological types for Texas in hopes that it would be used for Texas. The working group chose to use these criteria over *A weed risk assessment model for use as a biosecurity tool evaluating plant introductions* (Pheloung et al. 1999), because the California Invasive Plant and Pest Council has more scientific rigor, was created to assess plants that are already in the area and is being used by others throughout Texas.

These adapted Criteria will be used to standardize the addition of new species, prioritize future introductions and act as a tool to remove species from the priority list. These Criteria can act as a working method of adding and removing invasive plants to the City's top priority species list, but at minimum should be evaluated every 5 years by resource managers educated in local invasive species issues. The top 24 species, along with a summary of the results of the California Invasive Plant and Pest Council assessment, can be found in Table 4.5.2. The complete assessments can be found in Book 3, Appendices.

The working group chose not to prioritize species within the top 24 list, in part because data are not uniformly robust and distribution estimates are not specific to Austin. Each department should set priorities within the list in accordance with its mission and site specific scenarios. But, when an alert is triggered using the Criteria, that species should be deemed high priority city-wide.

In addition to prioritization by species, projects should be prioritized based on the site's restoration potential, ecological and community value and the invasive species present. Restoration potential takes into consideration the current ecological state of the site and the level of difficulty in reaching desired restoration goals. The potential for reinvasion is also a consideration. Reinvasion potential is influenced by such factors as degree of fragmentation, proximity to invasive seed sources and heaviness of use. The threat of invasive species to rare, threatened or endangered plant and animal species and to sensitive or valuable landscapes should be an important consideration when prioritizing sites. In addition, the site's ecological, social and educational value should be considered.

Resource availability and the potential for follow-up monitoring and treatment are important considerations when prioritizing projects. Projects with potential for collaboration and resource sharing with other departments and community groups should be given higher priority than projects lacking these opportunities. An invasive species coordinator would be instrumental in helping departments identify opportunities for collaboration as well as potential outside funding sources.

Lastly, the particular invasive species present, the degree of infestation and the impact of the particular invasives present on the ecological community should be considered when assigning management priorities. How severe are the potential ecological impacts of the species to the landscape? Are there reasons to delay treatment on particular individuals because of community attachment to them? Would complete removal significantly damage the soil or leave large areas bare, thus necessitating intensive restoration efforts? If so, a phased approach, in which areas are treated and restored little by little, is

Species	Common Name	Overall	Alert	Impact	Invasiveness	Distribution	Documentation
<i>Arundo donax</i>	Giant cane	High	no	A	B	A	3.84
<i>Eichhornia crassipes</i>	Water hyacinth	High	no	A	A	A	3.3
<i>Hydrilla verticillata</i>	Hydrilla	High	no	A	A	A	3.38
<i>Ligustrum lucidum</i>	Glossy privet	High	no	A	A	A	3.41
<i>Melia azedarach</i>	Chinaberry	High	no	A	B	A	2.69
<i>Phyllostachys aurea</i>	Golden bamboo	High	no	A	B	A	2.61
<i>Pueraria montana</i> var. <i>lobata</i>	Kudzu	High	no*	A	B	A	2.8
<i>Rapistrum rugosum</i>	Bastard cabbage	High	no	A	B	A	2.92
<i>Sorghum halepense</i>	Johnson grass	High	no	A	A	A	3
<i>Tamarix ramosissima</i>	Salt cedar	High	no	A	B	A	3.15
<i>Ailanthus altissima</i>	Tree of heaven	Moderate	no	B	B	A	3.08
<i>Broussonetia papyrifera</i>	Paper mulberry	Moderate	no	B	B	A	2.16
<i>Centaurea melitensis</i>	Malta star thistle	Moderate	no	B	A	A	3.15
<i>Colocasia esculenta</i>	Elephant ear	Moderate	no	B	A	A	2.5
<i>Cynodon dactylon</i>	Bermudagrass	Moderate	no	B	B	A	2.7
<i>Firmiana simplex</i>	Chinese parasoltree	Moderate	no	B	B	A	2
<i>Lonicera japonica</i>	Japanese honeysuckle	Moderate	no	B	B	A	3
<i>Macfadyena unguis-cati</i>	Cat claw vine	Moderate	no	B	A	A	2.15
<i>Nandina domestica</i>	Heavenly bamboo	Moderate	no	C	A	A	2.8
<i>Pistacia chinensis</i>	Chinese pistache	Moderate	no	B	B	A	1.6
<i>Pyracantha coccinea</i>	Pyracantha	Moderate	no	C	B	A	2.15
<i>Triadica sebifera</i>	Chinese tallow	Moderate	no	B	B	A	3.15
<i>Cyrtomium falcatum</i>	Hollyfern	Low*	no	B	C	A	1.14
<i>Bothriochloa ischaemum</i>	King Ranch blue stem	Unknown	no	B	B	U	2

\*see notes

Table 4.5.2. Top invasive species in Austin and summary of Weed Risk Assessments.

Table 4. 5.2. Continued.

**Rating**

1. High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
2. Moderate – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
3. Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
4. Not Listed - Evaluated but lack sufficient information to assign a rating or the available information indicates that the species does not have significant impacts at the present time.

**Alert** - Specific combinations of section scores that indicate significant potential for invading new ecosystems triggers an Alert designation so that land managers may watch for range expansions. Y = Yes, N = No

**Documentation** - Assessed as highest level of documentation for each criterion.

- 4 = Reviewed scientific publications
- 3 = Other published material (reports or other non-peer-reviewed documents)
- 2 = Observational (unpublished information confirmed by a professional in the field)
- 1 = Anecdotal (unconfirmed information)
- 0 = No information



likely appropriate.

#### **4.6 Standardization of Operating Procedures**

In order to streamline detection, treatment and monitoring activities, the working group recommends that a set of minimum standards for control, monitoring and training be established that all departments will meet. Each department is encouraged to write their own land management and integrated pest management plans, in keeping with departmental missions that will meet minimum standards. A full set of standard operating procedures will need to be developed once the plan is adopted. However, the working group has laid out the following actions and guidelines to be adopted as soon as possible.

##### **Standardized record keeping**

The working group recommends standardizing record keeping for all departments. A centralized database has been created by City of Austin staff to facilitate interdepartmental communication, early detection/rapid response and long term monitoring. The database is adapted from the Weed Information Management System, which was developed by the Nature Conservancy to help resource managers track invasive species locations, assessments (size and status of infestation to facilitate monitoring over time), and treatments applied (<http://tncinvasives.ucdavis.edu/wims.html>). The City of Austin system will allow land managers to link coverage and treatment data to maps. Watershed and park names describe gross areas, though precise information about treatment area is incorporated. Users can query the dataset to ascertain, for example, what work has been done in a particular watershed. Only city employees will be able to enter data into the system, and each department will maintain its own database, which will be incorporated into the central database automatically. Volunteer efforts will be entered by their staff contact.

An additional tool available to the city is the Eradicator Calculator. The Eradicator Calculator is an initiative of TexasInvasives.org intended to track the cost of treating invasives in Texas. The tool can be queried by city or county. Information about employee actions from the City of Austin database will be periodically exported to the calculator. Volunteer efforts are valued at \$21.35/hr, which is a standard value calculated by Independent Sector, a non-partisan coalition of charities, foundations and corporate giving programs. The value of volunteer time is based on the average hourly earnings of all production and nonsupervisory workers on private nonfarm payrolls (as determined by the Bureau of Labor Statistics). Independent Sector augments this value by 12 percent as an estimate for fringe benefits (Independent Sector 2011). This will help track direct costs to the city, the value of volunteer efforts and will place Austin's efforts within a statewide context.

##### **Crew implementation**

In order to help city work crews implement the plan, the working group has devised the following recommendations. Program managers should identify some implementation goals and decide where invasive species management falls among crew priorities. Each crew should have hands-on training on identifying and treating invasive species in addition to the fact sheets developed for this plan, and the working group should develop a short list of talking points about the rationale for dealing with these species, what to do about them and how to flag and report what they find. Departments should have a point-of-contact between the department and volunteers to coordinate efforts and decide when and where to use crews and when to use volunteers. The appropriate activities for both groups should be clearly defined. Each crew should have at least one licensed pesticide applicator and access to treatment materials and equipment.

##### **Herbicide/pesticide use**

The following guidelines are recommended for herbicide/pesticide use. Integrated pest management



should be used in all control efforts, meaning the least toxic, effective economical approach should be used first. In keeping with this approach, non-chemical options should be evaluated first. When it is determined chemical control is warranted, the least toxic, effective chemical should be used. Particular care must be taken in endangered species habitat, and documents such as Protection Measures for Pesticide Applications (White 2007), developed by the US Fish and Wildlife Service, may provide useful information in the determination of the least toxic, effective chemical. The Nature Conservancy's Weed Control Methods Handbook (Tu et al. 2001) is also a useful resource. Some departments, such as Watershed Protection, have conservation, management or integrated pest management plans in place that address this issue, and these department specific plans should be adhered to when they exist. All departments should require following all label requirements, including dilution, application and disposal of containers and licensing requirements for applicators. All departments should require equipment maintenance. What the law requires should be the minimum for all departments. Departments can adopt more rigorous policies. Licensing requirements for city staff, volunteers and contractors should be clarified and specified (Texas Department of Agriculture will have these requirements).

#### Volunteers

Volunteers are a crucial asset to successful invasive species management. Properly trained volunteers can greatly increase the effectiveness of early detection/rapid response and can increase the treatable area. Effective use of volunteers requires that their efforts be coordinated with those of city employees, that volunteers receive appropriate training, that managers can reliably ascertain a volunteer's level of training and that actions that are appropriate for volunteers are clearly defined. The working group recommends the development of a consistent policy between departments on use of volunteers which, as much as possible, resolves conflicts between department policies. The steps required to allow a volunteer to perform certain tasks, such as herbicide application, should also be clearly defined. A volunteer certification process/workshop should be developed that would enable volunteers to become qualified to use herbicides and chain saws (through Texas Department of Agriculture courses). The workshop manual should be used by all departments and the process should have different levels to qualify for different tasks. Volunteers will use both standard operating procedures and specific site plans to guide their work. Volunteer contributions should be tracked along with city efforts.

#### Public perception

Brush accumulation can be perceived as a fire hazard and eye sore to the general public. To reduce these concerns, accumulated cuttings should be disposed of appropriately. Various techniques such as wind-rows, chipping, and complete removal of woody slash have been adopted by city departments. Public perception should be taken into consideration on a site by site basis when deciding on the best management practice for brush control. In addition, it is important to notify neighborhoods that may be affected by the work. When work is being done in highly visible, high profile sites, letters should be sent explaining the work to be done, schedule, revegetation plan and contact information. Each Department should have access to a standardized yard-sign-sized sign that can be placed in high profile work areas to educate the public. These signs should have the logo of all plan development partners, a unified "brand" such as "Least Wanted" or "Hello...Goodbye" and a place for contact information (e.g. the city department, Austin Parks Foundation or Keep Austin Beautiful).

#### Adoption of standardized procedures

The following measures can be used to encourage adoption of standardized procedures. Managers should receive training on invasive standard operating procedures. Standard operating procedures should be readily available. Inspectors' site plans should include invasive management standard operating procedures. The plan and standard operating procedures should be integrated into City policy for all capital improvement projects and public development projects. In order to track the adoption



of standard operating procedures, the number of standardized trainings, and people trained, in each department can be tracked, and compliance can be evaluated as part of annual performance reviews.



## **Chapter 5**

### **Five Year Goals**

Success for this plan, in a general sense, is defined as effective interdepartmental coordination and, ultimately, a reduction in invasive species cover on city managed properties. In order to track progress toward these long term goals, the working group developed a set of measurable 5 year objectives which will track both plan implementation (are called for actions in place?) and plan effectiveness (is invasive coverage reduced?). Early on, emphasis should be on implementation and will shift, over time, toward measures of effectiveness. We suggest that the plan, and progress made in carrying out the plan, be evaluated every five years. Unless otherwise stated, the target date for the following objectives is 2016 or five years from plan adoption, whichever comes later. Objectives have been placed in four categories: Measurement, Control, Standard Procedures and Public Education (Figure 5.1).

Public education is particularly important for the success of this plan. Actions by the public affect city properties, positively and negatively. The council resolution calls for the enlistment of the public's help and to reduce negative impacts on properties through education. Coordination and branding will be required to improve literature, media or campaigns initiated by the city. However, it is important that this plan stay within the scope of its original charge, meaning that the plan directly influences city managed properties only. Non-city managed properties will be influenced indirectly through public education and outreach.



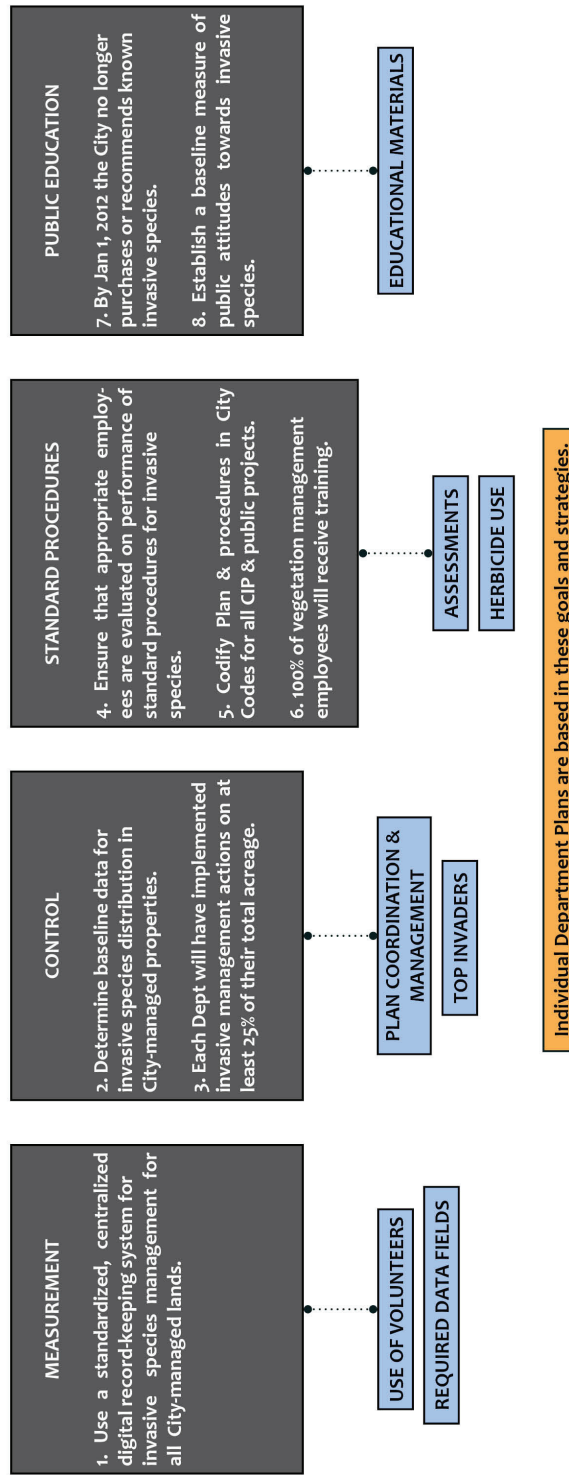


Figure 5.1. Five year goals

## Chapter 6

### Costs and Funding Sources

#### 6.1 Costs

This section provides estimates on the operating costs for staff, implementation and continuation of the Invasive Species Management Plan. In addition, this section will provide estimates on costs for control programs, revegetation and ongoing maintenance based on expenditures for control efforts. Program costs could be reduced through partnerships with local, regional, state and national organizations.

##### 6.1.1 Staffing Costs

The Working Group recommends that one FTE Invasive Species Coordinator and one GIS Analyst be retained to implement, catalogue and manage the Invasive Species Management Plan and to facilitate communication between departments. The costs associated with the positions described would be in addition to existing staff and budgets dedicated to invasive species management.

The Invasive Species Coordinator would work with city departments and partners to organize and catalog assessments, treatments and restoration activities among the various properties of all city departments. The Coordinator would plan and develop programs to train city staff and collaborate with internal and external agencies to meet plan goals. Additionally, the Coordinator would identify and explore funding opportunities for the overall invasive species management program as well as future salary requirements. It is also recommended that the coordinator's activities and priorities be determined by an Invasive Species Committee comprised of representatives of the six departments involved in invasive management.

The GIS Analyst would provide support to the Coordinator by updating and maintaining the spatial database of information related to assessments, treatments, restoration and follow-up activities. With six city departments working on various invasive species projects, a centralized repository is critical for management and information sharing.

The final recommendation is that the Coordinator and GIS Analyst position be placed in either Parks and Recreation or Watershed Protection, depending on which department has the best capacity to support and sustain the positions. Salary for these positions would be determined on level of experience. It is recommended that the Coordinator position be comparable to a Conservation Program Coordinator, and the GIS Analyst position fall under an Environmental Conservation Information Specialist.

##### 6.1.2 Implementation / Control Costs

This section outlines the cost to implement the goals, policy, and control priorities provided in Chapters 4 and 5. The cost of invasive species management on city managed lands is estimated for a one-year and five-year period based on the plan goals and estimated area treated in that time frame.

##### City Costs

The City of Austin - The Working Group estimated the cost of invasive species management, on all city managed property under the full-purpose jurisdiction, to be approximately \$10.9 million over the Five Year Goals period (Table 6.1.2.1). The cost estimate does not include the additional staff requested to provide oversight for management of the city-wide plan, nor does it include costs incurred by other city departments that are involved in land management activities. As a result of the plan covering all city-managed properties, all departments are expected to follow the five-year goals.

Using standardized treatment pricing (Appendix H), cost estimates and volunteer contributions for implementation and control are based on annual averages that each department has experienced in recent years. Each department provided an annual average of acres treated for that same time frame. Additionally, each department reported total acres or miles within their full-purpose jurisdiction, depending on categories of land management types. Unit costs, price per acre or mile, were extrapolated for departmental (staff) costs and volunteer contribution. Lastly, unit costs for each department, management type, and volunteer contribution were forecasted annually and five years in the future. The annual staff cost and volunteer contribution represents the costs to implement vegetation and invasive species management actions on 5% of departmental area each year. The five-year staff cost and volunteer contribution represents the costs to implement vegetation and invasive species management actions on 25% of departmental area, to meet the goals stated in the plan.

Table 6.1.2.1. City of Austin, Forecasted costs.

<b>City of Austin - Forecasted Costs</b>		
	Annual Direct Costs (5% area treated)	Total Direct Costs (25% area treated)
Austin Energy - Lake Walter E. Long <sup>1,2</sup>	\$45,000	\$225,000
Austin Energy - Transmission ROW <sup>1,2,3</sup>	\$1,317,624	\$5,251,400
Parks and Recreation - Preserves	\$316,000	\$1,579,745
Parks and Recreation - Urban Forestry	\$516,672	\$2,578,576
Water Utility - WQPL/BCP	\$11,377	\$56,885
Watershed Protection - Stormwater Ponds	\$26,487	\$131,454
Watershed Protection - Waterways	\$27,687	\$138,435
Volunteer Contribution <sup>4,5</sup>	\$177,899	\$888,368
<b>Total</b>	<b>\$2,438,746</b>	<b>\$10,849,863</b>

<sup>1</sup> Annual Treatment, 25% of area within full-purpose jurisdiction

<sup>2</sup> Five Year Treatment, 100% of area within full-purpose jurisdiction

<sup>3</sup> **Forecasted cost estimates apply to all vegetation management on corridors, including invasive species**

<sup>4</sup> Austin Parks Foundation Contribution (3,200 hours annually; 200 hours coordination included)

<sup>5</sup> Keep Austin Beautiful Contribution (3,742 hours annually; 200 hours coordination included)

#### Departmental Costs

**Austin Energy** – Analysis of vegetation management, including invasive species, for Austin Energy (Hydrilla and Transmission ROW) revealed that the department incurred an annual direct cost of \$1,317,624 to manage 138 miles of transmission corridors and \$45,000 to manage 254 acres of Lake Walter E. Long, totaling \$1,362,624. Austin Energy does not use volunteers.

Overall, the department is responsible for 550 miles of transmission corridors and 1,269 acres of Lake Walter E. Long that fall within the department's full purpose jurisdiction. Vegetation management on transmission corridors throughout the Austin Energy system includes treatment of all vegetation, not just invasive species. A transmission corridor is typically 100 feet wide.

Currently, Austin Energy has implemented vegetation and invasive species management actions on 25% of utility acreage each year, meeting goal 3 of control measures within the five-year goals (Table 6.1.2.2). The target goal of Austin energy is to treat 25% of utility area each year, reaching 100% utility area every five years.

Unit cost (acre) of treatment of hydrilla is estimated at \$177, and unit cost (mile) of treatment of transmission ROW is estimated at \$9,548.



Maintaining average unit costs for departmental direct costs, it is estimated that to meet the annual departmental goal of 25% area treated and five-year goal of 100% area treated, the department will experience an annual expense of \$1,362,624 and a total expense of \$5,476,400 at the end of five years.

Table 6.1.2.2. Austin Energy, Forecasted costs.

<b>Austin Energy - Lake Walter E. Long</b>			
	Unit Cost	Annual Direct Costs <sup>a</sup> (25% area treated)	Total Direct Costs <sup>b</sup> (100% area treated)
Area Equivalent	acre	254 acres	1,269 acres
Staff	\$177	\$45,000	\$225,000
<b>Total</b>	<b>\$177</b>	<b>\$45,000</b>	<b>\$225,000</b>

<sup>a</sup> One Year Goal, treatment of 5% of area within full-purpose jurisdiction

<sup>b</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

<b>Austin Energy - Transmission ROW</b>			
	Unit Cost <sup>a</sup>	Annual Direct Costs <sup>b</sup> (25% area treated)	Total Direct Costs <sup>c</sup> (100% area treated)
Area Equivalent <sup>1</sup>	mile	138 miles	550 miles
Staff	\$9,548	\$1,317,624	\$5,251,400
<b>Total</b>	<b>\$9,548</b>	<b>\$1,317,624</b>	<b>\$5,251,400</b>

<sup>a</sup> Forecasted cost estimates apply to all vegetation management on corridors, including invasive species

<sup>b</sup> One Year Goal, treatment of 5% of area within full-purpose jurisdiction

<sup>c</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

<sup>1</sup> Area Equivalent for transmission corridors is one mile length with a 100 foot width

Austin Parks and Recreation – Analysis of invasive species management for Austin Parks and Recreation Department (Preserves and Urban Forestry) revealed that the department incurred an annual direct cost of \$150,000 to manage 150 acres of preserves and greenbelts, and \$393,915 to manage 330 acres of urban forest, totaling \$543,915. The annual volunteer contribution to Austin Parks and Recreation averages about 7,389 hours per year, totaling \$157,756.

Overall, the department is responsible for 6,319 acres of preserves and greenbelts and 8,624 acres of urban forest that fall within the department's full purpose jurisdiction. Currently, Austin Parks and Recreation has implemented invasive species management actions on 2.4% of preserves and greenbelts and 3.8% of urban forestry acreage each year.

Unit cost (acre) of treatment of preserves and urban forest is estimated at \$1,000 and \$1,196 per acre, respectively.

Maintaining average unit costs for departmental direct costs, it is estimated that to meet the annual departmental goal of 5% area treated and five-year goal of 25% area treated, the department will experience an annual expense of \$832,672 and a total expense of \$ 4,158,321 at the end of five years (Table 6.1.2.3). Annual volunteer contributions, at the amount of 7,657 hours per year or \$163,478, would be required to meet the five-year goal. Total contribution of volunteers over the five-year period would equal 38,285 hours or \$816,263.





Table 6.1.2.3. Austin Parks and Recreation, Forecasted costs.

Austin Parks and Recreation - Preserves			
	Unit Cost	Annual Direct Costs (5% area treated)	Total Direct Costs <sup>a</sup> (25% area treated)
Area Equivalent	acre	316 acres	1,580 acres
Staff	\$1,000	\$316,000	\$1,579,745
Volunteer Contribution <sup>1</sup>	\$930	\$139,395	\$696,071
<b>Total</b>	<b>\$1,930</b>	<b>\$455,395</b>	<b>\$2,275,816</b>

<sup>a</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

<sup>1</sup> Annual Direct Volunteer Contribution (6,529 hours annually, valued at \$21.35/hr)

Austin Parks and Recreation - Urban Forestry			
	Unit Cost	Annual Direct Costs (5% area treated)	Total Direct Costs <sup>a</sup> (25% area treated)
Area Equivalent	acre	432 acres	2156 acres
Staff	\$1,196	\$516,672	\$2,578,576
Volunteer Contribution <sup>1</sup>	\$56	\$24,083	\$120,192
<b>Total</b>	<b>\$1,252</b>	<b>\$540,755</b>	<b>\$2,698,768</b>

<sup>a</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

<sup>1</sup> Annual Direct Volunteer Contribution (860 hours annually, valued at \$21.35/hr)

Austin Water Utility – Analysis of invasive species management for Austin Water Utility, Wildland Conservation Division (Water Quality Protection Lands and Balcones Canyonlands Preserve) revealed that the utility has incurred annual direct costs of \$12,477 and annual volunteer contributions of \$15,129 each year for the last four years.

Currently, the Wildland Conservation Division has implemented invasive species management actions on more than 5% of utility acreage each year, meeting goal 3 of control measures within the five-year goals (Table 6.1.2.4). That percentage equals to approximately 1,500 acres each year of the 22,753 acres within the full-purpose jurisdiction of the Wildland Conservation Division. Unit costs (acre) of treatment ranges from \$7.70 to \$11.80 per acre, depending on the use of prescribed fire versus alternative invasive species treatment for control. The annual direct volunteer contribution to the Wildlands Division averages about 709 hours per year.

Maintaining an average unit cost of \$10 per acre for departmental direct costs, it is estimated that to meet the annual goal of 5% area treated and five-year goal of 25% area treated, the department will experience an annual expense of \$11,377 and a total expense of \$56,885 at the end of five years. Annual volunteer contributions, at the amount of 538 hours per year or \$13,652, would be required to meet the five-year goal. Total contribution of volunteers over the five-year period would equal 2,690 hours or \$68,260.

It is anticipated that the Austin Water Utility, Wildland Conservation Division properties will not require additional resources to meet this goal within the next five years. The more urban/developed properties of Austin Water Utility may require additional resources to meet the control goal in the next five years.

Table 6.1.2.4. Austin Water Utility, Forecasted costs.

Austin Water Utility - WQPL/BCP			
	Unit Cost <sup>a</sup>	Annual Direct Costs (5% area treated)	Total Direct Costs <sup>b</sup> (25% area treated)
Area Equivalent	acre	1,138 acres	5,689 acres
Staff	\$10	\$11,377	\$56,885
Volunteer Contribution <sup>1</sup>	\$12	\$13,652	\$68,260
<b>Total</b>	<b>\$22</b>	<b>\$25,029</b>	<b>\$125,145</b>

<sup>a</sup> Unit cost dependent upon inclusion of prescribed burning versus optional treatments (\$7-12/acre)

<sup>b</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

<sup>1</sup> Annual Direct Volunteer Contribution (709 hours annually, valued at \$21.35/hr)

Austin Watershed Protection – Analysis of invasive species management for Austin Watershed Protection Department (Stormwater Ponds and Waterways) revealed that the department incurred an annual direct cost of \$67,060 to manage 80 miles of waterways and \$19,602 to manage 20 acres of stormwater ponds, totaling \$86,662. Overall, the department is responsible for 660 miles of waterways and 534 acres of stormwater ponds that fall within the department's full purpose jurisdiction.

Currently, the Watershed Protection Department has implemented invasive species management actions on 12% of waterways, prioritized as the Urban Watershed Regulation Areas, and 3.7% of the total stormwater pond acreage.

Unit cost (mile) of treatment of waterways and stormwater ponds is estimated at \$839 and \$981, respectively (Table 6.1.2.5). The annual direct volunteer contribution to the Watershed Protection Department averages about 36 hours per year.

Maintaining average unit costs for departmental direct costs, it is estimated that to meet the annual goal of 5% area treated and five-year goal of 25% area treated, the department will experience an annual expense of \$54,174 and a total expense of \$269,889 at the end of five years. Annual volunteer contributions, at the amount of 35 hours per year or \$769, would be required to meet the five-year goal. Total contribution of volunteers over the five-year period would equal 180 hours or \$3,845.

Table 6.1.2.5. Austin Watershed Protection, Forecasted costs.

Austin Watershed Protection - Stormwater Ponds			
	Unit Cost	Annual Direct Costs (5% area treated)	Total Direct Costs <sup>a</sup> (25% area treated)
Area Equivalent	acre	27 acres	134 acres
Staff	\$981	\$26,487	\$131,454
<b>Total</b>	<b>\$981</b>	<b>\$26,487</b>	<b>\$131,454</b>

<sup>a</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

Austin Watershed Protection - Waterways			
	Unit Cost	Annual Direct Costs (5% area treated)	Total Direct Costs <sup>a</sup> (25% area treated)
Area Equivalent	mile	33 miles	165 miles
Staff	\$839	\$27,687	\$138,435
Volunteer Contribution <sup>1</sup>	-	\$769	\$3,845
<b>Total</b>	<b>\$839</b>	<b>\$28,456</b>	<b>\$138,435</b>

<sup>a</sup> Five Year Goal, treatment of 25% of area within full-purpose jurisdiction

<sup>1</sup> Incomplete Data, Annual Direct Volunteer Contribution (36 hours annually, valued at \$21.35/hr)

## 6.2 Potential funding sources

A wide range of strategies and actions will be required to achieve the goals of this plan. Efforts to prevent, detect, treat and monitor invasive species are often delayed by the lack of funding. Education and outreach require funding for implementation of successful campaigns and the development and distribution of materials. The city should work with governing officials, partners, stakeholders, industry and federal entities to establish permanent funding sources for invasive species programs in the city. When applying for funding opportunities, the city should incorporate the contributions of volunteer and public sector organizations to increase the amount of matching funds from granting programs.

### 6.2.1 Federal Funds

Table 6.2.1. Federal Funds

Grant Name	Grant Size	Match Required	Lead Sponsor	Proposal Due Date	Application Due Date	Eligibility
5 Star Restoration Program	\$10-40k	100%	EPA	N/A	2/14/2011	a, b, c, d, e
Source Reduction Assistance	\$10-130k	5%	EPA	6/30/2011	2/24/2011	a, b, c, d, e
Targeted Watersheds Grant Program	\$40-60k	25%	EPA	N/A	5/19/2010	a, b, c, d, e
Conservation Innovation Grant	\$75k	50%	NRCS	12/28/2010	3/4/2011	a, f, h
Conservation Reserve Program	\$50k	50%	NRCS	N/A	N/A	a, e, f
Conservation Stewardship Program	\$40k	0%	NRCS	N/A	N/A	f
Coop. Conservation Partner Initiative	\$200k	100%	NRCS	5/27/2010	N/A	a, b, c, e
Environmental Quality Incentives Prg	N/A	25%	NRCS	N/A	N/A	f, h
Grassland Reserve Program	\$50k	25%	NRCS	N/A	N/A	h
Wetland Reserve Program	\$1300/ac.	25%	NRCS	N/A	N/A	f
Wildlife Habitat Incentives Program	\$50k	25%	NRCS	N/A	N/A	b, c, f
Native Plant Conservation Initiative	\$15-75k	100%	NWFW	6/30/2011	10/15/2011	a, b, c, d, e
Pulling Together Initiative	\$15-75k	100%	NWFW	7/15/2011	10/14/2011	a, b, c, d
Urban and Community Forestry	N/A	N/A	USFS	N/A	N/A	N/A

- a. Nonprofit Organizations
- b. Local and County Government
- c. State Government
- d. Federal Government Agencies
- e. Educational Institutions
- f. Private Landowners
- g. Service Area
- h. Eligible Lands/Producer

### U.S. Environmental Protection Agency

#### 5 Star Restoration Program

The Five Star Restoration Program brings together students, conservation corps, other youth groups, citizen groups, corporations, landowners and government agencies to provide environmental education and training through projects that restore wetlands and streams. The program provides challenge grants, technical support and opportunities for information exchange to enable community-based restoration projects. At the completion of Five Star projects, each partnership will have experience and a demonstrated record of accomplishment, and will be well positioned to take on other projects. Aggregating over time and space, these grassroots efforts will make a significant contribution to our environmental landscape and to the understanding of the importance of healthy wetlands and streams in our communities.

Website: <http://www.epa.gov/owow/wetlands/restore/5star/>

#### Source Reduction Assistance - CFDA 66.717

EPA requires the applicant to provide a minimum 5% match, as part of the total allowable project cost, in order to receive an award. Awards are issued annually by the Regions. The purpose of issuing SRA



awards is to support environmental projects that reduce or eliminate pollution at the source. In Fiscal Year 2011 the Regions are interested in funding proposals that encourage greenhouse gas reduction, toxic and hazardous materials reduction, resource conservation, efficient business practices and P2 integration activities. Applicants are strongly encouraged to submit proposals that demonstrate new, innovative techniques, surveys, studies or use research, investigations, experiments and/or training promoting P2/source reduction efforts. Proposals that principally support recycling, clean-up, treatment, disposal or energy recovery activities will not be considered for funding.

Website: <http://www.epa.gov/p2/pubs/grants/index.htm#sra>

#### Targeted Watersheds Grant Program

The Targeted Watersheds Grant Program encourages watershed organizations to collaborate and implement environmental change. EPA awards cooperative agreements to assist in building the capacity of watershed organizations so that these organizations are better positioned to undertake restoration and protection efforts and produce measurable environmental results.

The objective of the capacity building component of the TWG Program is to develop the capacity of watershed organizations. The objective is two-fold: 1) to promote the organizational development and growth of local watershed partnerships and stakeholders committed to improving and maintaining the natural and economic resources of their watersheds; and 2) to provide training and technical assistance to these groups so they can better address watershed-based problems and help develop sustainable solutions.

Website: [http://water.epa.gov/grants\\_funding/twg/initiative\\_index.cfm](http://water.epa.gov/grants_funding/twg/initiative_index.cfm)

#### U.S.D.A. Natural Resources Conservation Service – Texas Programs

##### Conservation Innovation Grant

The Conservation Innovation Grant program is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns.

Website: <http://www.tx.nrcs.usda.gov/programs/CIG/index.html>

##### Conservation Reserve Program

The Conservation Reserve Program provides technical and financial assistance to eligible farmers and ranchers to address soil, water and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The Conservation Reserve Program reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter-strips or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.

Website: <http://www.tx.nrcs.usda.gov/programs/crp/index.html>

##### Conservation Stewardship Program

The Conservation Stewardship Program is a voluntary conservation program that encourages producers to address resource concerns in a comprehensive manner by undertaking additional conservation activities and improving, maintaining and managing existing conservation activities. The program provides equitable access to all producers, regardless of operation size, crops produced or geographic

location. The resource concerns that have overarching priority in Texas are water quantity, soil erosion and plant health and condition.

Website: <http://www.tx.nrcs.usda.gov/programs/CSP/index.html>

#### Cooperative Conservation Partner Initiative

The Cooperative Conservation Partnership Initiative is a voluntary conservation initiative that enables the use of certain conservation programs with resources of eligible partners to provide financial and technical assistance to owners and operators of agricultural and nonindustrial private forest lands.

A primary intent is to leverage non-Federal government resources along with NRCS program resources to achieve resource conservation objectives. The purposes of the partnership agreement are to: (1) Address conservation priorities involving agriculture and nonindustrial private forest land on local, State, multi-state or regional levels; (2) Encourage producers to cooperate in meeting applicable Federal, State and local regulatory requirements related to production; (3) Encourage producers to cooperate in the installation and maintenance of conservation practices; and (4) Promote the development and demonstration of innovative conservation practices and delivery methods, including practices associated with specialty crop and organic production and precision agriculture operations.

Website: <http://www.tx.nrcs.usda.gov/programs/CCPI/index.html>

#### Environmental Quality Incentives Program

EQIP is a continuous sign-up program that allows landowners or operators to apply for financial and technical assistance for the application of specific conservation practices. Higher priority will be given to those applications that address national, state and local priorities and provide higher cost efficiency.

The NRCS in Texas supports the locally led process through local work groups and provides EQIP funding to every county. The State Technical Committee and Local Work Groups have concurred in the practices eligible for financial assistance to treat the identified resource concerns.

Website: [http://www.tx.nrcs.usda.gov/programs/EQIP/11/counties\\_s\\_y/travis.html](http://www.tx.nrcs.usda.gov/programs/EQIP/11/counties_s_y/travis.html)

#### Grassland Reserve Program

Assist landowners to restore and protect grassland, rangeland, pastureland, shrub land and certain other lands. It provides assistance for rehabilitating grasslands, grazing uses and related conservation values using rental contracts and permanent easements.

Applications will be rated based on ranking and selection criteria developed in the states following broad national guidelines. USDA proposes that land eligibility criteria should focus on preserving the nation's most critical grassland resources, the native and natural grasslands and shrub lands.

Participants may choose a 10, 15 or 20-year rental contract with USDA providing annual payments. Or participants may choose a permanent GRP easement held by either the United States or an eligible entity.

Expanding land eligibility criteria to include land that has been historically dominated by grassland, forbs or shrubland when it contains historical or archaeological resources or when it would address issues raised by State, regional and national conservation priorities. Implementation of GRP management plan is required.

Website: <http://www.tx.nrcs.usda.gov/programs/GRP/index.html>

#### Wetland Reserve Program

The Wetlands Reserve Program is a voluntary program offering landowners the opportunity to protect, restore and enhance wetlands on their property. The USDA Natural Resources Conservation Service provides technical and financial support to help landowners with their wetland restoration efforts.

WRP program objectives are to: purchase conservation easements from, or enter into cost-share agreements with willing owners of eligible land; help eligible landowners protect, restore and enhance



the original hydrology, native vegetation and natural topography of eligible lands; restore and protect the functions and values of wetlands in the agricultural landscape; help achieve the national goal of no net loss of wetlands; improve the general environment of the country.

Website: <http://www.tx.nrcs.usda.gov/programs/wrp/index.html>

#### Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan and NRCS agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. NRCS and program participants enter into a cost-share agreement for wildlife habitat development. The state objective is to restore and conserve native wildlife habitats with emphasis on prairies and savannahs, riparian zones, wetlands, forestland and woodlands and thorn shrub. Emphasis will be placed on restoring native habitats of species experiencing declines or reduced populations due to agricultural impacts. Additional consideration will be given to applications that have a high likelihood of success and that will result in a significant change in the existing habitat. Offers that provide a definite benefit to federally listed threatened or endangered species will receive extra points in the ranking. Applicants must own or be in control of the land and be in compliance with the conservation provisions of the Food Security Act of 1985 as amended regarding highly erodible land and wetlands.

Website: <http://www.tx.nrcs.usda.gov/programs/whip/index.html>

#### National Fish and Wildlife Foundation

##### Pulling Together Initiative

The Pulling Together Initiative seeks proposals that will help control invasive plant species, mostly through the work of public/private partnerships such as Cooperative Weed Management Areas. PTI applications are accepted from private non-profit (501)(c) organizations, federally recognized Tribal governments, local, county, and state government agencies, and from field staff of federal government agencies. Individuals and for-profit businesses are not eligible to receive PTI grants, but are encouraged to work with eligible applicants to develop and submit applications to PTI. PTI applications must provide a 1:1 non-federal match for their grant request.

Website: [http://www.nfwf.org/AM/Template.cfm?Section=Charter\\_Programs\\_List&TEMPLATE=/CM/HTMLDisplay.cfm&CONTENTID=19753](http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&TEMPLATE=/CM/HTMLDisplay.cfm&CONTENTID=19753)

#### Native Plant Conservation Initiative

Supports on-the-ground conservation projects that protect, enhance and/or restore native plant communities, including pollinators, on public and private lands. Projects fall into one of six categories: conservation, education, restoration, research, sustainability and creating data linkages for native plant conservation in North America.

Eligible applicants include 501(c) non-profit organizations and local, state or federal government agencies. For-profit businesses and individuals are not eligible to apply directly to this program, but are encouraged to work with eligible applicants to develop and submit proposals. Organizations or projects that have received funding and have been successfully completed under this program are eligible and encouraged to re-apply.

Website: [http://www.nfwf.org/AM/Template.cfm?Section=Charter\\_Programs\\_List&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=20321](http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=20321)

#### U.S.D.A. Forest Service

##### Urban and Community Forestry

Urban and Community Forestry (UCF) is a cooperative program of the US Forest Service that focuses on the stewardship of urban natural resources. UCF responds to the needs of urban areas by maintaining,



restoring and improving urban forest ecosystems. Through these efforts the program encourages and promotes the creation of healthier, more livable urban environments across the nation. UCF provides technical, financial, research and educational services to local government, non profit organizations community groups, educational institutions and tribal governments. The program is delivered through its legislative partners, the state forestry agencies. Programs will be focused on issues and landscapes of national importance and prioritized through state and regional assessments. Three national themes provide a framework for this work: conserve working forest landscapes, protect forests from harm and enhance benefits associated with trees and forests.

Website: <http://www.fs.fed.us/ucf/nucfac.html#grants>

### 6.2.2 State Funds

Table 6.2.2. State Funds

Grant Name	Grant Size	Match Required	Lead Sponsor	Proposal Due Date	Application Due Date	Eligibility
319(h) Grant	\$165-870k	40%	TCEQ	6/1/2011	7/29/2011	b, c, e
State Wildlife Grants	\$50k	35%	TPWD	N/A	Oct.	a, c, e

- a. Nonprofit Organizations
- b. Local and County Government
- c. State Government
- d. Federal Government Agencies
- e. Educational Institutions
- f. Private Landowners

#### Texas Commission on Environmental Quality – 319(h) Grants

The Texas Commission on Environmental Quality and the Texas State Soil and Water Conservation Board administer federal grants for activities that prevent or reduce nonpoint source pollution. Grants are awarded annually and fund projects for up to three years. The grants are made available through a federal program authorized under Section 319 of the Clean Water Act.

Applicants are encouraged to partner with other local, state and federal authorities to increase the impact of their activities. Private organizations may participate in projects as partners or contractors but may not apply directly for funding.

A project must address the objectives, goals and/or priorities identified in the State of Texas Nonpoint Source Management Program or nonpoint source elements in the Texas Coastal Management Plan. Priority is given to funding development and implementation of watershed protection plans or Total Maximum Daily Load Implementation Plans.

Website: <http://www.tceq.texas.gov/waterquality/nonpoint-source/grants/grant-pgm.html>

#### Texas Parks and Wildlife Department - State Wildlife Grants

The State Wildlife Grants Program is a distributed conservation fund under the Wildlife and Sport Fish Restoration Program managed by the U.S. Fish and Wildlife Service. Eligible and ineligible general actions for SWG are defined by the 2007 U.S. Fish and Wildlife Service Guidelines. Specific projects and guidance from the Action Plan are listed in the Conservation Action Priorities document for SWG and HLLP.

Conservation projects should contribute to threat/impact reduction to improve the condition of species of greatest conservation need (SGCN), habitats/systems on which they depend, and/or natural processes that support habitat function, as defined by the 2005 Wildlife Action Plan. Additional priority will be given to projects that promote collaboration with partners and emphasize conservation on private lands. Funding emphasis will be on site or field-based projects that contribute directly to conservation action and/or management of priority resources, in the following categories: Restoration and/or Management, Land and/or Water Protection, Survey, Monitoring, Capacity Building/Planning and Outreach.

Website: <http://www.tpwd.state.tx.us/business/grants/wildlife/swgrants/>





### 6.2.3 Local Funds

Table 6.2.3. Local Funds

Grant Name	Grant Size	Match Required	Lead Sponsor	Proposal Due Date	Application Due Date	Eligibility
Neighborhood Partnering Program	\$75-150k	25-40%	COA	N/A	N/A	a, e, g
Park Grants Program	\$50k	100%	APF	8/16/2011	9/30/2011	g
Urban Forest Grant Program	N/A	N/A	COA	N/A	N/A	a, b, e, f, g

- a. Nonprofit Organizations
- b. Local and County Government
- c. State Government
- d. Federal Government Agencies
- e. Educational Institutions
- f. Private Landowners
- g. Service Area

#### Austin Parks Foundation

The purpose of the Park Grants Program is to build and strengthen community support for parks, enabling neighborhood residents to make positive changes in their parks and surrounding communities. Grants support collaborative efforts that build a sense of community ownership for the park. Every year, Austin Parks Foundation offers the chance to apply for grants to improve their neighborhood parks. Grantees are required to match the grant fund with volunteer labor, community fund raising and in-kind donations.

Grants will fund community-driven initiatives that enhance public parks and green space owned and managed by the City of Austin Parks & Recreation Department. APF will place priority on projects that demonstrate active and committed community involvement, include a diversity of community partners and employ creativity and innovation in project implementation and partnerships.

Website: <http://www.austinparks.org/npg.html>

#### City of Austin

##### Neighborhood Partnering Program

Created by the Austin City Council, the Neighborhood Partnership Program provides opportunities for community and neighborhood organizations to effect public improvements by sharing in the costs of those efforts with the City of Austin government.

All projects must be done on City owned property or in City right of way. Qualified applicants include: a neighborhood association registered with the City of Austin; a neighborhood plan contact team; a community-based organization; educational, ethnic or religious organizations.

Website: <http://www.ci.austin.tx.us/publicworks/npprogram.htm>

##### Urban Forest Grant Program

The Urban Forest Grant Program was established to promote conservation and other projects that benefit Austin's urban forest. Projects associated with tree planting and preservation, education, public service announcements, disease control and management of invasive species are eligible for funding. The grant program is designed with a diverse range of categories to encourage creative and innovative proposals. Proposals could include replanting or preservation of public and neighborhood trees lost or damaged in storms or by disease, the creation of public service announcements promoting tree conservation and preservation, or inventive education/training programs that introduce tree preservation and care to diverse audiences.

A fund created to mitigate the impact of tree removals supports the grant program. The program aims to achieve a balance between re-forestation and preservation. Public, non-profit or private entities such as, businesses, governmental agencies, academic and private institutions, homeowners or neighborhood



associations, youth groups, civic groups and non-profit organizations may apply for funding.  
Website: <http://www.ci.austin.tx.us/trees/ufgp.htm>

### Volunteer Organizations

Austin Parks Foundation - <http://www.austinparks.org/>  
Keep Austin Beautiful - <http://www.KeepAustinBeautiful.org/>

### 6.2.4 Private Funds

Table 6.2.4. Private Funds

Grant Name	Grant Size	Match Required	Lead Sponsor	Proposal Due Date	Application Due Date	Eligibility
Brown Foundation, Inc.	N/A	N/A	Private	N/A	N/A	a
Lee and Ramona Bass Foundation	\$350k +	0%	Private	N/A	N/A	a, e, f
Native Plant Society of Texas	\$500-2k	0%	Private	N/A	N/A	e
Xcel Energy Foundation	\$4-20k	0%	Private	N/A	N/A	a, e, f, g
Texas American Water	\$10k	0%	Private	N/A	N/A	a, b, c, e, g

- a. Nonprofit Organizations
- b. Local and County Government
- c. State Government
- d. Federal Government Agencies
- e. Educational Institutions

#### Brown Foundation, Inc.

The purpose of The Brown Foundation, Inc. is to distribute funds for public charitable purposes, principally for support, encouragement and assistance to education, the arts and community service. The Brown Foundation's current emphasis is in the field of public education at the primary and secondary levels. The Foundation will focus on supporting non-traditional and innovative approaches which are designed to improve public education primarily within the State of Texas.

In all program areas, the Foundation is interested in funding projects which fulfill one or more of the following criteria: addressing root causes of a concern rather than treating symptoms; serving as a catalyst to stimulate collaborative efforts by several sectors of the community; resulting in a growing, long-lasting impact on the situation beyond the value of the grant itself; and, reflecting and encouraging sound financial planning and solid management practices in administration of the project.

Grant requests will be considered only from tax-exempt organizations described in Section 501(c)(3) of the Internal Revenue Code (the "Code") and further classified as a public charity within the meaning of Section 509(a) of the Code, or governmental units described in Section 170 of the Code.

Website: <http://www.brownfoundation.org/index.asp>

#### Lee and Ramona Bass Foundation

The Lee and Ramona Bass Foundation was established to support nonprofit organizations that provide important services for people, primarily within the state of Texas. The Foundation funds grants in the following categories: schools, colleges and universities within Texas, with emphasis placed upon faculty development and liberal arts programs; community programs and projects, particularly related to the arts and the environment, such as museums, zoos and educational/research institutions; national and regional conservation programs.

To be eligible for consideration by the Foundation, an organization must have received a determination letter or letters from the Internal Revenue Service indicating that it is an organization described in Section 501(c)(3) of the Internal Revenue Code of 1986 and is treated as other than a private foundation within the meaning of Section 509(a) of the code. An organization also may qualify if it falls within the



terms of Section 170(c)(1) and the contribution requested is to be used exclusively for public purposes.  
Website: <http://www.leeandramonabass.org/Introduction.html>

#### Xcel Energy- Foundation Grants

Xcel Energy Foundation strives to build partnerships which enhance the environment and foster an ethic of conservation and preservation. In 2010, grants were awarded to environmental education, stewardship and partnerships across the service territory. The foundation prefers: environmental education, environmental awareness; and environmental partnerships (habitat and park projects, special projects/partnerships)

The following are ineligible to receive grant funding from the Xcel Energy Foundation: Organizations that are not designated 501(c)(3) by the IRS, programs outside of Xcel Energy's regulated service area, research programs or government agencies.

Website: [http://www.xcelenergy.com/About\\_Us/Community/Foundation\\_Grants](http://www.xcelenergy.com/About_Us/Community/Foundation_Grants)

#### Texas American Water- Environmental Grant Program

Texas American Water provides an Environmental Grant Program to support innovative, community-based environmental projects that improve, restore or protect watersheds and community drinking water supplies. The program is designed to support diverse types of activities, such as watershed cleanups, reforestation efforts, biodiversity projects, streamside buffer restoration projects, wellhead protection initiatives and hazardous waste collection efforts.

Project activities and outcomes should address a watershed or source water protection need in the local community within American Water service areas. Source water protection projects are activities that result in the protection or improvement of the community's public drinking water supplies. Watershed protection projects should focus on activities that improve, restore or protect one or more watersheds.

Website: <http://www.amwater.com/txaw/Ensuring-Water-Quality/environmental-grants-program.html>

### 6.2.5 Additional Websites

U.S.D.A. National Agricultural Library, National Invasive Species Information Center

Manager's Tool Kit, Grants and Funding- <http://www.invasivespeciesinfo.gov/toolkit/grants.shtml>

Center for Invasive Plant Management

Research, Grants Program - <http://www.weedcenter.org/research/grants.html>

Funding Opportunities - <http://www.weedcenter.org/funding/funding.html>

U.S.D.A. Natural Resource Conservation Service

Texas Programs- <http://www.tx.nrcs.usda.gov/programs/>

Midwest Invasive Plant Network

Grants- <http://www.mipn.org/grants.html>



## **Chapter 7**

### **Conclusion**

Invasive aquatic, riparian and terrestrial plant species influence the productivity, value and management of a broad range of land and water resources in the City of Austin. Each city department has tackled the invasive species issue with varying degrees of success depending on departmental expertise and available resources. At the same time, the citizens of Austin have become increasingly aware of the invasive threat to Austin's parks, riparian and natural areas. With that awareness, a desire to preserve and protect the quality of Austin's open spaces is developed.

The economic and ecological damage from invasive species will continue to rise in Austin without a well-organized and adequately funded strategy to implement preventive programs. This report recommends that invasive species management programs remain the responsibility of the individual departments with jurisdiction over city-owned properties; however the city should establish an invasive species coordinator who will assist each department with their invasive plant management efforts. The invasive species coordinator will lead the city in this important effort by implementing the five-year goals (Chapter 5) following the strategies outlined in Chapter 4.



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